SECTION 282601

PERSONAL ALARM SYSTEMS (PAS)

PART 1 GENERAL

1.01 RELATED WORK FURNISHED BY OTHERS

A. PAS equipment is being installed under other State contracts, all work required by this contract will be required to coordinated with the work of the other State contracts.

B. Certain services and materials identified as "(Provided or Furnished by Others)" in this specification section are to be purchased by the owner through the State contracts.

1. The services being provided by others are identified in PART 1 of this specification section.
    a. Coordinate and schedule the performance of these services with the Director's Representative so that they are performed to coincide with performance of the work required by this contract.
2. The materials being provided or furnished by others are identified in PART 2 of this specification section.
    a. These materials are to be installed as part of the work required by this contract. Contractors shall include the cost of the labor to install these materials in their bid amount.
    b. Coordinate and schedule the delivery of these materials with the Director's Representative so that the materials are delivered prior to (or coinciding with) when they are to be installed.
    c. Coordinate the exact placement of these materials with the state contractor and Director's Representative.
3. Unless clearly identified as "(Furnished or Provided by Others)" in this specification section, Contractors shall include the cost for all work (materials, services, installation, etc.) in their bid amount.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Firestopping: 078400.

1.03 REFERENCES

A. Underwriters Laboratories Inc.

B. National Electrical Code (NEC)

1.04 DEFINITIONS:

A. Provide: Deliver to the project site all required equipment and accessories, install and interconnect all required equipment and accessories for a complete and operational system.

B. Furnished: Equipment or support systems delivered to site by others.

C. Company Field Advisor – An individual meeting the requirements below:
   1. An employee of the company producing the PAS equipment, who is certified in writing by the company to be technically qualified in design, installation, servicing, and testing of the required products. Personnel involved solely in sales do not qualify.

1.05 DESCRIPTION OF THE EXISTING SYSTEM

A. The existing personal assistance system in use at the facility is a Secure Systems Inc. (SSI). The system uses Personal Alarm Locator (PAL) worn or carried by assigned personal that is activated by a button press. The PAL transmits to Device Activated Detectors (DAD) located throughout the facility. The DADs in turn communicate with Building Alarm Reporting Devices to report the location and activated PAL assignment information to the Main Computer Console. The SSI also communicates between buildings using BASE units that transmit radio frequency signals.

1.06 MODIFICATIONS TO EXISTING SYSTEM

A. Provide a replacement Personal Assistance System (PAS) that shall operate as an integrated monitoring and alarm system. By activation of a personal assistance transmitter the system detects, locates and annunciated at the Central Console in the Administration Building (Bldg No. 16). The personal duress alarm receivers will be installed in Buildings throughout the campus and on selected fence lines. The transponders located in the buildings will be connected to the Central Console by using spare phone cable conductors. Multilayer maps shall be provided to provide location from the site level, building level, floor level and to the designated alarm zone for each floor.
   1. Central Console software shall allow the Operator and Application Software Maintenance personnel to interact with and/or modify the Software and related databases that are password protected.
   2. A "No Alarms Screen" shall provide the Operator with a portion of the map of the System's coverage area.
   3. If not fully contained on the screen, the map shall be scrollable to show any region of the System's total coverage area. The Software shall allow the Operator to place the mouse-driven cursor anywhere on the map display and, by pressing a button on the mouse, cause that point on the map to be centered on the screen.
   4. The words, "No alarms" shall be displayed across the top of the screen followed by the current time and date.
   5. A Menu Bar across the top of the Normal Operating Screen shall permit the operator to access all computer system functions by use of drop-down menus titled, "File", Utilities", "Logout", "Setup", "About", "Printer", and “Network”.
   6. The System shall allow the Operator to perform all of the functions necessary to dispatch aid in the event of an Alarm transmission, and to monitor the progress of Alarms and Tests.
   7. The System shall automatically write to the appropriate databases any Alarm and Test times, dates, Transmitter ID numbers, and any other data as called for by the particular database.
   8. The Software shall have password protected databases for adding, deleting, changing or otherwise modifying the system data.
   9. The system shall activate remote enunciators identifying the activated alarm zone.

10. Upon activation of an Alarm the system shall provide preprogrammed information associated with the activated transmitter and shall initiate the appropriate Map for the campus, building, building floor and each alarm zone within the building.

1.07 SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 013300 does not apply to this Section.:

B. Submittal Requirements:

1. Submittals required by this section are to be submitted in packages as follows:
   a. Submittals Package 1: Quality Control Submittals (Company Field Advisor information) specified below at the same time as a package.
      1) Submit Submittals Package 1 within 15 days of contract award.
   b. Submittals Package 2: Submit Product Data, Shop drawings and Quality Control Submittals specified below at the same time as a package.
      1) Submit Submittals Package 2 within 60 days of receipt of approval of Submittals Package 1.
   c. Submittals Package 3: Submit Point to Point Wiring Diagrams specified below at the same time as a package.
      1) Submit Submittals Package 3 within 30 days of receipt of approval of Submittals Package 2.
   d. Submittals Package 4: Submit Contract Closeout Submittals specified below at the same time as a package.
      1) Submit Submittals Package 5 within 7 days after completion of the System Acceptance Test, and its acceptance by the Director's Representative.
2. It is the Contractor's responsibility to review and verify that all information required for each submittal package is included in the submittal package. Errors or omissions found by the Contractor are to be corrected prior to the Submittals Package submission for approval. Incomplete Submittal Packages submitted for review and approval will be returned.
   a. It is the Contractor's responsibility to verify that portions of the submittal packages provided by a Sub-Contractor are complete as well as portions of the submittal packages being provided directly by the Contractor.
   b. The Company Field Advisor shall be responsible for reviewing each complete submittal package prior to its submission for review and approval.
      1) This review by the Company Field Advisor shall include review of portions of the Submittal Package assembled and inserted into the Submittals Package by the Contractor (or Sub-Contractors).
      2) Letter(s) from the Company Field Advisor shall be included in the Submittal Packages, stating that the Company Field Advisor has reviewed the entire Submittal Package for accuracy and completeness and approves all materials and installation methods included in the Submittal Package.
      3) Errors or omissions found by the Company Field Advisor are to be corrected prior to the Submittals Package's submission for approval.

C. Quality Control Submittals (Submittals Package 1):
   1. Company Field Advisor Data (Provided by TYCO), Include:
      a. Name, business address and telephone number of Company Field Advisor secured for the required services.
      b. Certified statement (letter) from the Company that produced the System listing the qualifications of the Company Field Advisor. The certification statements from the Company shall include the following:
         1) Information stating that the Company Field Advisor is experienced in the engineering, design and installation of the Equipment being proposed for use.
         2) Each product for which the Company gives authorization for the Company Field Advisor to oversee installation of and each service the Company Field Advisor can perform in their behalf, listed specifically for this project.
         3) The certification shall include statements from the person providing the certification, stating:
            a) That they have read requirements for the Company Field Advisor as written in this section of the Project Manual and certify that the proposed individual is capable of performing the duties of the Company Field Advisor in the Company's behalf.
            b) That the person providing certification of the Company Field Advisor is authorized by their company to provide this certification in the Company's behalf.
            c) Telephone number and Email address of the person providing certification.
      c. Listing of similar projects that the Company Field Advisor has worked on in the past 3 years.
      d. Listing of training that the Company Field Advisor has received on the equipment being provided for this project.
         1) Provide copies of Training Certificates received for completion of training courses.

D. Product Data (Provided by TYCO) (Submittals Package 2):
   1. Bill Of Materials: Provide a Bill Of Materials identifying each system device or component proposed to be used for this system as listed in PART 2 PRODUCTS of this section.
      a. The Bill Of Materials shall provide the following information:
         1) Identify each item by name and model number.
         2) Indicate the page number(s) in the Submittal Package where information required for that item can be found.
         3) Identify the appropriate specification section, Article number, paragraph and subparagraph where that item is listed in the project manual.
   2. Catalog sheets, specifications and installation instructions.
      a. Catalog sheets shall be marked up by the contractor to clearly identify exact what item is being submitted for approval and marked up clearly indicating what options the item will have to meet the contract requirements.
   3. Include calculations used to size 1-the battery backup of the PAS Transponder and multiplex receivers and 2- the UPS computer system backup for a twenty-

minute minimum back-up time (Calculate a 2 hour backup if there is no standby generator power available).

E. Shop Drawings (Provided by TYCO) (Submittals Package 2):
   1. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted), including video signal integrity equipment, surge protection, etc. required for a complete system.
   2. Alarm map drawings for the campus, each building, each floor within the buildings and each alarm zone within the buildings.

F. Quality Control Submittals (Provided by TYCO) (Submittals Package 2):
   1. Installers' Qualifications Data: Include a completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work.
      a. Forms must be completely filled out. Incomplete forms will be returned for correction with no action taken.
      b. Forms must include all information required by this section of the Project Manual, showing that the experience criteria have been met.
      c. Each form must be signed by the installer. Forms without signatures shall be disapproved.
         1) Submit forms with original installer signatures to the Director's Representative within three days of submission of Submittal Package 2.
   2. Work Plan:
      a. Include in the work plan required by section 015634 all work associated with the modifications to this system.
      b. Submit a work plan of how the work relating to this system shall be performed. Schedule shall include:
         1) A brief description of the work to be performed at each phase.
         2) Estimated time durations required to perform each phase of the work.
         3) Date that Pre-installation Training Meeting will be held.
            a) Pre-installation Training Meeting should not be held more than 1 week prior start of the installation of any system component listed PART 2 PRODUCTS for this system unless an earlier time is agreed upon by the Director's Representative.
         4) Delivery dates that materials being provided under this contract will be required to be at the contract site.
   3. Uninterruptible Power Supply Data: Include:
      a. Load Calculations: Provide load calculations proving that the proposed UPS shall provide full power to the Video Graphic Map Display and Video Control Console (VCC) for an eight hour period.
      b. Battery Purchase Data: Statement indicating proposed date for battery purchase and installation.
   4. Name, address and telephone number of nearest fully equipped service organization.
   5. Letter from the Company Field Advisor: Accompanying the Submittals Package there shall be a letter from the Company Field Advisor, stating that the Company Field Advisor has reviewed the Submittals Package for accuracy and

completeness and approves all materials and installation methods included in the Submittals Package.

a. The accompanying letter shall also include statements as follows:
   1) State that the Company Field Advisor has reviewed the Bill Of Materials for accuracy and completeness and approves all items listed on the Bill Of Materials for use.
   2) State that the Company Field Advisor has reviewed the System Description for accuracy and completeness and approves the System Description for use.
   3) State that the Company Field Advisor has reviewed the Shop Drawings for accuracy and completeness and approves the Shop Drawings for use.
      a) Letter shall list each drawing by designation Number and Drawing Title that the Company Field Advisor has reviewed and approved.

b. Submit letter with original Company Field Advisor signature to the Director's Representative within three days of submission of Submittal Package 2.

G. Point to Point Wiring Diagrams (Provided by TYCO) (Submittals Package 3):
   1. Submit complete point to point wiring diagrams of the entire system as it is to be installed.
      a. Point to Point wiring diagrams shall show the following:
         1) All components in the system.
         2) All cables and conductors between each component.
         3) Identify all cables and conductors and show all terminations and splices (identification shall correspond to markers to be installed on each conductor).
      b. Point to Point wiring diagrams shall have an accompanying letter from the Company's Field Advisor stating that the Company's Field Advisor has reviewed the Point to Point wiring diagrams for accuracy and completeness and approves the Point to Point wiring diagrams for use.
         1) Letter shall list each drawing by designation Number and Drawing Title that the Company Field Advisor has reviewed and approved.
         2) Submit letter with original Company Field Advisor signature to the Director's Representative within three days of submission of Submittal Package 3.

H. Contract Closeout Submittals (Provided by TYCO):
   1. System acceptance test report.
   2. Certificate: Affidavit, signed by the Company Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
   3. Operation and Maintenance Data:
      a. Deliver 2 paper copies and 4 CDs, covering the installed products, to the Director's Representative. Include:
         1) Operation and maintenance data for each product.
         2) Complete point to point wiring diagrams (As-Built Drawings) of entire system as installed. Identify all conductors and show all

terminations and splices (identification shall correspond to markers installed on each conductor).

3) Show all new fire stopping locations.

4) Name, address, and telephone number of nearest fully equipped service organization.

4. Provide electronic copy of all database and system set up files, maps and employee database set up files including photo ID to provide a complete system restore.

1.08 QUALITY ASSURANCE (Provided by TYCO)

A. Installer's Qualifications: The persons installing the Work of this Section and their supervisor shall be personally experienced in closed circuit television systems and shall have been engaged in the installation of security systems for a minimum of 3 years.

1. Qualifying experience must be in the installation of systems similar in operation and construction of the system being specified by this section.
2. Furnish to the Director completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work. Each form shall include:
   a. Installer's name.
   b. Employer's Name and Address.
   c. Qualifying Experience: Project information of 5 similar projects, which the installer, had worked on during the past 3 years. Information shall include for each project:
      1) Name and Address of project.
      2) Dates installer worked on project.
      3) Name and telephone number of installer's supervisor for the project.
      4) Types of security installation work installer performed on project.

B. Company Field hours for the following: Secure the services of a certified and experienced Company Field Advisor for a minimum of 24 working hours for the following:

1. Assist in the formation of the Submittals Packages.
2. Conduct a pre-installation meeting at the contract site with the installers (and their supervisor) who will be performing the work, the Director's Representatives and facility supervisory and maintenance personnel. The meeting shall be a minimum of 4 hours in duration (held in two 2 hour increments). The topics covered shall include, but shall not be limited to the following:
   a. Company field advisor shall present an overview of the system as it is to be installed.
   b. Company field advisor shall lead a discussion of installation concerns and coordination issues on this system and related systems and related work being installed under this project.
   c. Company field advisor shall provide training on procedures for installing system components and precautionary measures installers should be aware of while performing the work.
      1) Company field advisor shall review wiring requirements for each component of the system with the installers and provide training

on termination, bonding and grounding procedures required for proper installation of the system wiring.

3. Provide supervision of the installation at the contract site for a minimum of 16 hours and for the following:
   a. Supervise the installation of system components and modifications to the system.
   b. Render advice regarding installation of system components, modifications to the system and final adjustment of the system.
   c. Perform programming of the system.
   d. Perform Preliminary Tests of the system and certify with an affidavit that the system is installed in accordance with the contract documents and is ready for the System Acceptance Test.
   e. Provide training of system operation and maintenance.
   f. Perform final systems test and certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.

1.09 WARRANTY (Provided by TYCO)

A. Manufacturer's Warranty: A minimum 1-year warranty for the Security Escort System equipment as provided by the equipment manufacturer.

B. Installation Warranty: 1-year warranty on all Security Escort Wireless Communication System equipment and wiring.

1.10 MAINTENANCE (Provided by TYCO)

A. Service Availability: A fully equipped service organization shall be available to service the completed PAS. Ensure the service organization is capable of providing the 4-hour on site response time to a service call, 24 hours a day, and seven days a week.

1.11 SPARE PARTS (Provided by TYCO)

A. Furnish the following spare parts:
   1. Ten of each size fuse for all electronic equipment.
   2. Two Receivers
   3. Two Transponder power supply
   4. Two Alert Unit power supply
   5. Two Chime Units
   6. One LED unit
   7. One SE485 interface adapter

PART 2 PRODUCTS

2.01 GENERAL

A. Provide all equipment listed in the following Product Specification sub-sections but not limited to Section 2 of this Specification or Contract Drawings for a complete and operational PAS system.

2.02 TRANSMITTERS (PROVIDED BY TYCO)

A. All Transmitters shall be modular in style and include the following:

B. Each Basic Duress Transmitter shall be a miniature, battery operated, hand-held radio transmitter designed for the purpose of transmitting both a Distress Alarm and a Test Signal. Radio transmissions shall occur in the 304 MHz band reserved for security applications.

C. Basic Duress Transmitters shall be packaged in a conveniently sized key-retainer type enclosure to encourage users to carry it on their person at all times. The enclosure shall be produced from U.L. Component Recognized material "Cycolac ABS" and shall measure approximately [2.7 inches long, by 1.5 inches wide, by 0.7 inches deep.] [6.8 cm long, by 3.8 cm wide, by 1.8 cm deep.] With transmitter circuitry and battery included, the package shall weigh approximately [1 ounce] [28 grams].

D. Upon activation, generate an Alarm transmission to the receivers.

E. A digitally coded Alarm transmission shall be generated when the two buttons are pushed simultaneously. The Basic Duress Transmitter shall automatically repeat the Alarm transmissions every 8 seconds for 15 minutes after it is activated by the User. The Basic Duress Transmitter shall be designed such that the user may press either button, release, then press the remaining button to activate a test transmission.

F. Buttons shall be recessed to prevent accidental usage.

G. The design of the Basic Duress Transmitter shall assure a nominal battery life of four years including four test transmissions by the User each day.

H. The Transmitter shall be designed to operate within the temperature range of [-22 degrees F to +145 degrees F.] [-30 degrees C to +65 degrees C.]

I. Object monitoring transmitters shall be available

J. MAKE: Bosch Security Systems SE2 Subscriber Transmitter.

K. Provide a quantity of (250) SE2 Personal Alarm Transmitters.

2.03 PERSONAL ALARM SYSTEM RECEIVER (PROVIDED BY TYCO)

A. Multiplex Receivers shall be designed to detect and receive Alarm, Test, and supervisory transmissions from Subscriber Personal Transmitters, and relay the information to the Transponders.

B. The Multiplex Receivers indoor enclosure shall be vandal resistant. The enclosure shall consist of a base plus screw mounted cover manufactured from General Electric Noryl, Grade FN-215, with dimensions of [9.0 inches high, by 7.0 inches wide, by 1.8 inches deep.] [22.9 cm high, by 17.8 cm wide, by 4.6 cm deep.] The cover shall mount to the base with four tamper-resistant screws held captive in the cover, and the cover shall contain two clear lenses for the exhibition of status lights, and a circular opening to permit an internal sounder to be heard.

C. Electronic circuitry for the Multiplex Receiver shall be constructed on a single piece, U. L. Component Recognized circuit board. Components on the circuit board shall include a red colored alarm status light, a green colored test-successful status light, a piezo-electric sounder capable of a minimum 85 dB output, and provisions to disable these components when installed in an outdoor enclosure. Status lights shall be Light Emitting Diodes (LEDs).

D. Each Multiplex Receiver circuit board shall also contain a tamper switch to detect the removal of the cover.

E. Solid conductor cabling shall be used per manufactures recommendations.

F. Multiplex Receivers shall be connected to Transponders via an unshielded, untwisted, 18 AWG, fire rated 4-conductor cable. The cable jacket color shall be Yellow.

G. Multiplex Receivers shall be designed to operate within the temperature range of [-40 degrees F to +149 degrees F.] [-40 degrees C to +65 degrees C.]

H. Receivers shall be wall mounted per Manufactures recommendations and securely fastened to the wall surface with anchored assemblies to reduce the possibility of removal by vandalism

I. Tyco is to turn over the indoor PAS receiver backplate for installation by this Contract.

J. MAKE: Bosch Security Systems EA102A-304 receive electronics, with AE100 indoor housing and AE101 outdoor enclosure.

2.04 ALERT UNITS (PROVIDED BY TYCO)

A. Alert Units shall be designed to provide visual (LED's) and audio (Chime units) indications of an emergency situation, and visual indications of a successful test of a Personal Transmitter.

B. Each Alert Unit shall consist of two parts, a self-contained Strobe/Siren section and an Electronic Driver section.

C. The Strobe/Siren section shall be connected to the Electronic Driver section via an 18 AWG, fire rated 4-conductor cable (Chimes) or 18 AWG, fire rated 2-conductor cable for LED's . Solid conductor cabling shall be used and the cable jacket color shall be yellow.

D. The Alert Unit shall be connected to a Transponder via an 18 AWG, fire rated 4-conductor cable. The cable jacket color shall be yellow.

E. Each Alert Unit shall identify itself to its Transponder through use of a binary Multiplex Address, which shall be set during installation using a multi-position switch installed on the Driver's circuit board.

F. Power for the Alert Unit shall be provided by a multi-output power supply.

G. The alert unit shall be provided with the standard gray enclosure with keyed lock.

H. MAKE: Bosch Security Systems EA120B.

2.05 CHIMES (PROVIDED BY TYCO)

A. Chimes shall have selectable outputs for field selectable settings.

B. Power for the chimes shall be provided by alert units (12 VDC).

C. Make system sensor CHW white chime.

2.06 MULTI-OUTPUT POWER SUPPLY MOPS (PROVIDED BY TYCO)

A. The MOPS shall be used to power the alert units.

B. 16 VAC at 18A or 18VAC at 16 selectable output.

C. 115VAC 50/60Hz, 2.7A input with surge suppression.

D. Main fuse rated 25A, 32V.

E. Eight protected outputs.

F. Make: Altronix AL168175CB

2.07 TRANSPONDER (PROVIDED BY TYCO)

A. The Transponder shall be designed to monitor and control Multiplex Receivers and to communicate Alarm, Test and Trouble information back to the Central Console via Cat5 cable connected to an SE485 interface adapter located at the Central Control Console

B. The Transponders supports eight buses.

C. Electronic circuitry for the Transponder shall be constructed on a single-piece, UL Component Recognized circuit board.

D. There shall be an allowable maximum of 255 Transponders in the System, and each Transponder shall be identified with a number from 1 to 255, which shall be set during installation using an 8-position switch installed on the circuit board.

E. If there is no Test, Alarm or Trouble message sent within a minute, the Transponder shall automatically send an "I'M OK" message, which shall be acknowledged by the Central Console's computer.

F. If a Transponder determines that it has lost communications with the Central Console because its messages are not being acknowledged, it shall assume control of the sounders and lights of the Multiplex Receivers connected to it, and shall begin to send "I'M OK" messages every minute until acknowledged by the Central Console.

G. If the Transponder receives an Alarm message from one or more of its Receivers during a loss of communications with the Central Console, it shall treat all such alarms as valid

alarms. Further, the Transponder shall activate the sounders and red alarm status lights of all connected Receivers that detected the Alarm transmission, for four minutes.

H. Transponders shall retain control of their Receivers and Alert Units until communications with the Central Console has been established, and the Transponder has received a "Release Control" command from the Central Console. On receipt of the command, the Transponder shall send any Alarm and Trouble messages to the Central Console that were stored during the loss of communications, and shall relinquish control of its Alert Units, and the sounders and red alarm status lights of its Receivers, to the Central Control.

I. Each Multiplex Bus shall be capable of supporting up to eight Multiplex Receivers or alert units.

J. Transponders shall be capable of supporting up to eight Multiplex Busses for a total of 64 Multiplex Receivers or alert units.

K. Each bus shall be automatically numbered from 0 to 7 depending on the bus terminals on the circuit board to which they are connected.

L. Transponders shall communicate on the data exchange wiring with Multiplex Receivers by issuing commands, which contain the Receivers binary Multiplex Address. As a given Transponder may have up to eight devices connected to it with the same binary Multiplex Address, the complete identification of a particular device shall include the Transponder Identification number, the bus number, and its binary Multiplex Address.

M. Transponders shall poll each connected Multiplex Receiver for a status check ten times each second.

N. Transponders shall be designed to operate within the temperature range of [-40 degrees F to +149 degrees F.] [-40 degrees C to +65 degrees C.]

O. MAKE: Bosch Security Systems EA500B (8-bus, 64 points), and TR1850 transformer with 4 amp hour batteries minimum and battery charger

2.08 SE485 INTERFACE (PROVIDED BY TYCO)

A. The SE485 is the interface between the RS-485 signal bus of the transponder and serial bus (RS-232) of the central computer console.

B. Power shall be provided by a 120VAC adapter to 9VDC, 300mA UL listed, Class 2, plug-in type transformer.

C. The SE485 shall be connected to the transponder with two twisted pair, four connector, 22 AWG cable.

D. Make: Bosch Security Systems SE485.

2.09 ENCLOSURES-TRANSPONDER (PROVIDED BY TYCO)

A. The electronic components shall be housed in an indoor enclosure.

B. The cover shall secure to the enclosure using a keyed lock.

C. The enclosure shall be equipped with the optional tamper switch to detect the opening of the cover or its removal from a wall.

D. The large indoor enclosure shall be manufactured from painted 20 Ga., cold-rolled steel and shall measure [15 inches wide, by 4.25 inches deep, by 14.5 inches high] [38 cm wide, by 10.8 cm deep, by 36.8 cm high].

E. The enclosure shall have provisions for housing two 12 volt, [7 amp-hour] batteries. Batteries shall be wired in parallel to provide [14 amp-hours] of standby battery capacity.

F. MAKE: Bosch Security Systems AE3 Large enclosure.

2.10 CENTRAL COMPUTER CONSOLE & LCD SCREEN

A. The Central Console Computers, video console display monitor, mouse, keyboard, interconnecting cabling and rack mounted UPS are provided by OMH/CIT.

B. The Central Computer Console shall be the primary human interface to the System, shall be located indoors in a climate controlled environment, and shall be manned 24 hours a day by qualified Operators of the Facility.

C. The Console shall consist of two rack mounted computers (racks provided by CCTV project) and desktop monitors, a printer, and backup power.

D. The computers shall be IBM compatible.

E. Minimum requirements for each computer shall be:
1. Windows 7 compatible system with network card.
2. RS232 serial port card.
3. RAM sufficient for operating system and installed software.

F. 19’’ LCD screen VGA (640x480) at 256 colors minimum, 800x600 High color (16 bits) recommended, 1024x768 High color supported. True color (24 bits) is also supported. If displaying subscriber images, High color (16 bits) or true color (24 bits) should be used.

G. Each computer shall be powered from a 120 VAC power source, and each shall be connected to its own 1200 VA (minimum) Uninterruptible Power Source (UPS) for backup power. Each UPS shall be connected to the facility’s stand by power system.

H. One computer shall be designated as the Main Controller for the entire System, and the other computers shall serve as real-time backups and remote workstations.

I. The designation of "primary" and "back-up" shall be accomplished by the manual positioning of "A/B" data transfer switches.

J. Cat5 cabling shall also be installed between the two computers for real-time data exchange.

K. The Security Escort(R) Application Software shall differentiate which computer has been designated as the Main Controller and is exchanging data with the Transponders.

L. After data exchange between the Main Controller and transponders has been completed, the software shall cause the backup computer to be updated.

M. The Application Software shall also cause the computers to continually exchange information to test that their records are current. This shall be done as a background task.

N. The computers shall contain the primary databases for the System.

O. A Subscriber Database linking the name of the User, User Classification (i.e., Maintenance, Nursing, Security, Employee, etc.), Personal Transmitter Identification Number assigned to the User, Building, work area, department, and home addresses, emergency phone numbers, current status, Personal Transmitter battery status, last Test date and time, and any special text information associated with the User such as a handicap or special needs.

P. An Operator Database linking passwords and the names of those individuals authorized to work on, add, delete, change and/or otherwise modify the System in any way, with their Authority Level to do so.

Q. When the Central Console detects a valid response from a Transponder after a loss of communications, the Central Console shall send a "Release Control" command to the Transponder and resume control of the Transponder's Alert Units and its Receivers' status lights and sounders.

R. The Application Software shall assure that the Backup computer is kept up-to-date in real time so that the Backup computer is available to assume System control without delay.

S. The Application Software shall permit the Main Controller, Backup and Remote computers to be used for Administrative functions such as adding, deleting, changing or otherwise modifying databases, or performing routine system tests.

NOTES:

1. LAN network to the PAS head end/Control Console. (by OMH/CIT)
2. Owner to provide minimum 19" LCD Screens for the PAS computers.
3. Provide UPS units for each PC with surge protection connected to the facility's standby power source.
4. Emergency power circuits are required. Surge protection shall be provided by Contractor. Provide Ditek DTK-1F for each plug in outlet utilized for PC locations.
5. Digital Camera Canon PowerShot A720IS 8MP Digital Camera with 6x Optical Image Stabilized Zoom or equal with USB connection to computer and tripod for employee database input by Contractor. All employee database set up with photo ID input shall be provided by the Contractor.

T. Signal Extenders: USB Micro Extender ACU4222A.

U. Provide rack mounting hardware as required.

2.11 APPLICATION SOFTWARE (FURNISHED BY TYCO)

A. System Software shall be written and designed to require little or no computer literacy on the part of the Operator.

B. The Software shall allow the Operator to perform all of the functions necessary to dispatch aid in the event of an Alarm transmission, and to monitor the progress of Alarms and Tests.

C. The Software shall present the Operator with a Graphical User's Interface (GUI) at all times, and shall permit the use of a "Mouse" for on-screen cursor control.

D. The Software shall, wherever possible, permit the Operator to issue a computer command by "clicking" on a GUI generated "button", or by using a single specified key on the keyboard.

E. The Application Software shall automatically write to the appropriate databases any Alarm and Test times, dates, Transmitter ID numbers, and any other data as called for by the particular database.

F. The Software shall allow access to the databases for the purposes of viewing, adding, deleting, changing or otherwise modifying the data contained in the database.

G. Database access shall be restricted to personnel contained in the Operator's database. All employee and system database programming by Contractor.

H. Database access shall further be restricted by the Authority Level assigned to the personnel in the Operator's database.

I. Authority Levels shall be controlled only by the Director of Security or Owner designated

J. The Owner shall have access to the Security Escort Software license code through an Escrow account to allow for software changes and support by others.

K. MAKE: Security Escort(R) System Application Software, Revision level 4.00 or later (most current version). System shall be sized for 1000 users

2.12 DISPLAY SCREENS (PROVIDED BY TYCO)

A. The Software, through the construction and display of Screens on the Central Console's computer monitor, shall allow the Operator and Application Software Maintenance personnel to interact with and/or modify the Software and related databases.

B. A "No Alarms Screen" shall provide the Operator with a portion of the map of the System's coverage area.

C. If not fully contained on the screen, the map shall be scrollable to show any region of the System's total coverage area. The Software shall allow the Operator to place the mouse-

driven cursor anywhere on the map display and, by pressing a button on the mouse, cause that point on the map to be centered on the screen.

D. The words, "No alarms" shall be displayed across the top of the screen followed by the current time and date.

E. A Menu Bar across the top of the Normal Operating Screen shall permit the operator to access all computer system functions by use of drop-down menus titled, "File", Utilities", "Logout", "Setup", "About", "Printer", and “Network”.

F. Contractor shall install and set up all Graphic screens with device locations on Owner supplied AutoCAD drawing files on the system computers.

2.13 RS485 DATA BUS CABLING (FURNISHED BY TYCO)

A. Four conductor, unshielded, jacketed #18 A.W.G. solid-conductor cable shall be used as an RS485 Data Bus to connect up to 16 Transponders to the Central Console. The conductors shall be grouped into pairs with each pair twisted on its own axis. Suitable for underground duct-bank, wet locations

B. The maximum lengths of wire between transponder and SE485 are 20,000 ft. for up to 4 transponders, 10,000 ft. for up to 8 transponders, 5,000 ft. for up to 12 transponders, and 3,000 ft. for up to 16 transponders.

C. Provide 66 style (category 5e) connecting block for termination of the transponder wiring. Provide connecting clips, plastic covers, and retaining clip necessary to terminate transponder wiring.

2.14 LED NOTIFICATION PANEL (PROVIDED BY TYCO)

A. LED notification panel shall contain at least 8 LEDs for each zone.

B. The enclosure shall be 3 gang stainless steel.

C. Panel shall have red LEDs with custom lettering.

D. Make: Alarm Controls Corporation Model No. AC-SPN2941.

2.15 SWITCHES (PROVIDED BY TYCO)

A. RS-232 switch is used for switching the signals for SE425 interface unit: BlackBox Model No. SW980A.

B. KVM switch is used for switching CPUs: BlackBox ServSwitch UNO Model No. KV6508SA with rack mount kit KV6016FA-R2.

C. USB switch is used for switching the signals for USB printer: BlackBox Model No. SW4007A-USB.

2.16 ALARM ZONE MAPS (PROVIDED BY TYCO)

A. Alarm zone maps shall be provided by Contractor, approved by CFA and coordinated with the Facilities Security Supervisor and Director's Representative.

B. Maps shall be provided as scaled color drawings.

C. Disk shall be provided along with the maps, which includes drawings in Windows bitmap file format (.bmp) with 2556 colors (8 bit color).

D. Each floor within the same building shall have the same resolution and are vertically aligned with the same origin.

E. Maps shall clearly distinguish the different alarm zones assigned and clearly identify areas of uncertainty for adjacent alarm zones.

2.17 CABLES AND CONNECTORS (FURNISHED BY TYCO-IS)

A. Receiver Cables: Multi-conductor (Unshielded) Plenum rated cable with 4 individual insulated, unshielded, 18 AWG solid copper wires enclosed in a yellow jacket; Paige 740034 series or equal as recommended by CFA.

B. 485/232 Interface cable: 25 pin to 9 pin straight computer cable, MAGTEK 22410302 or as recommended by CFA.

2.18 MARKERS AND NAMEPLATES

A. Markers:
   1. Premarked self-adhesive; W.H. Brady Co.'s B940, Thomas and Betts Co.'s E-Z code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.'s permanent wire markers.
   2. Flexible sleeve markers; Plastic Extruded Parts Inc.'s FS series..
   3. Snap-on markers; Plastic Extruded Parts Inc.'s RS series.

B. Nameplates: Precision engraved letters and numbers with uniform margins, character size minimum 3/16 inches high.
   1. Phenolic: Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
   2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

2.19 ACCESSORIES

A. System shall include all accessories required to perform the functions summarized in SYSTEM DESCRIPTION and indicated on the drawings.

PART 3 EXECUTION

3.01 INTERRUPTIONS TO EXISTING SYSTEM

A. All work must be performed in such a manner so as to maintain operation of the existing SSI personal assistance system until system acceptance testing has been completed and approved.

3.02 INSTALLATION

A. Install system in accordance with the Company's printed instructions unless otherwise directed by the Company Field Advisor.
   1. Installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of work.
   2. Install necessary wiring in accordance with manufacturer's recommendations and this document.
   3. All wiring shall be installed in accordance with NFPA 70, the National Electrical Code and applicable Electrical Codes.
   4. Provide all necessary field adjustments and tuning to provide required alarm annunciation and proper operation at all locations.
   5. Provide 100% area testing of system coverage to insure total alarm receipt coverage.
   6. Provide all system database set up, floor plans/map set up and employee database set up with photo ID input for a complete and operational system.
   7. Owner to provide dedicated 120-volt, 20-ampere circuit in separate conduit as a source of primary power for the Central Computer Console.
   8. Contractor to Provide "while in use" covers with lockable covers for all facility provided 120 VAC receptacles utilized for the system components
   9. Install all Central Computer Console hardware that is supplied by the Owner and install all software and initialize all databases.
   10. Perform walk tests and set up procedures for each receiver as specified by the manufacturer to insure that all boundaries of coverage are sufficient to detect alarm transmissions in each intended coverage area.
   11. Contractor shall provide complete wiring diagrams to the Owner as part of the shop drawing submittal, and shall supervise the installation in order to insure a complete operating and trouble-free system.
   12. Provide 4 sets of keys for all panels, stations and devices.
   13. Contractor shall provide UL Fire stopping systems for all new penetrations created by contractor for this system installation.
   14. Contractor shall verify that Bosch system functions correctly before connecting to campus wide network system.

B. Wiring: All cable shall be plenum rated and yellow for the PAS System.
   1. Install conductors concealed above the ceilings and run with hangers and protective straps. Exception: Conductor types that require surface wiring due to field conditions. All surface wiring must be installed in surface metal conduit and fastened with two hole straps with compression fittings. Where installed in wet locations; provide raceway and connectors in compliance with NEC for Wet locations.

2. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors
3. Connect system components requiring a primary power supply to dedicated 120vac branch circuits.
4. Make all connections or splices at the system components, interconnection cabinets, terminal strip cabinets, and equipment enclosure only. Connections or splices will not be allowed at any other location in the system.
5. Use wire management products to bundle, route, and support wiring in junction boxes, pull boxes, wire ways, gutters, channels, and other locations where wiring is accessible.
6. All wiring not installed in conduit shall be plenum rated.
7. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B Standard, manufacturer's recommendations, and best industry practices.

C. Mounting Hardware:
1. Mount all equipment and support systems using center pin reject style tamper proof mounting screws.

D. Identification, Labeling, Marking:
1. Install the Security Escort System wiring diagram adjacent to the IT Room equipment enclosures as indicated on the drawings.
2. Install ¾" x 3" engraved Phenolic, Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white) nameplates on all devices.
3. Identify all wires and cables by system and function in cabinets with pre-marked, self-adhesive, wraparound type markers. Designations shall correspond with the point-to-point wiring diagrams.
4. Insert a copy of the battery warranty with each UPS in a clear plastic folder and mark the date placed in service.

3.03 TESTING

A. Installation Contractor shall submit a written test report that the system has been 100% tested and approved prior to scheduling the final acceptance test with Owner and Consultant.

B. Final test shall be witnessed by the Director's Representative, Design Engineer, and Chief Security Officer or Owner's designated representative, and performed by the Installation Contractor.

C. Final test report must be received and acknowledged by the Owner prior to request for final payment.

D. Provide instruction to the Owner's satisfaction with regard to proper use and operation of the system.

3.04 FIELD QUALITY CONTROL

A. Cable Test:
1. Electronically test all cables with multi-meter to verify cables integrity supervision of the Bosch Factory Company Field Advisor.

2. Test all new cables prior to making final connections to control and remote equipment. Provide written test results and certification of the wire test. Measure the insulation resistance between each conductor, ground, and shielding using a high impedance multi-meter. The resistance must be infinity.
3. Replace any cable that fails to meet these parameters and retest new cables.
4. Provide all test equipment required for testing.
5. Provide wiring test results to the Owner's Representative.

B. Preliminary System Test:
1. Preparation: Have the Bosch Company Field Advisor adjust the Completed systems and then operate both Systems for a period of one week to assure that they are functioning properly. The test shall include, but not limited to, the following:
   a. Turn on the transponder(s).
   b. Run stress test for communications reliability test.
   c. Check the communications between the transponder and receivers.
   d. Check the receivers database records and verify if they are correct.
   e. Back up database files to the hard drive.
   f. Test RF reception, LED operation, and locations of each receiver.
   g. Test the receivers by transmitting an alarm from the maintenance transmitter. The receiver should activate by flashing the red lights (if the sounder jumper is in the place on the receiver). This confirms that the RF portion of the receiver is working and you are at the right location. Proceed to the other receivers and perform the same operation until the operation of all receivers is confirmed and all receivers are working and in their proper location on that transponder.
   h. Verify communications of each transmitter by pressing the test feature on any transmitter. The Test in Progress LED shall come on. If it does not come on, the receivers are not communicating with the transponder. About a second after the Test in Progress LED comes on, the Transmit Data LED flashes (indicating the transponder is sending the test message to the central console). Less than a second later, the Receive Data LED flashes (indicating the central console returned an acknowledgement).
2. Verify operations of LED notification panel and audible devices, in particular at adjacent alarm zone areas.

C. System Acceptance Test:
1. CFA shall review and approve test procedures prior to testing.
2. Test shall cover all coverage boundaries as indicated.
3. Notify the Director's Representative and Company Field Advisor at least 3 working days prior to the test so arrangements can be made to have them witness the test.
4. Perform the following:
   a. Demonstrate to the Director's Representative and Company Field Advisor that every receiver station responds to the transmitter as programmed.
   b. Test and record random sampling of transmitters in interior and exterior.
5. Include the written acceptance report of the test results, signed by Company Field Advisor and Director's Representative, in the O&M Manuals.

D. Close Out submission
   1. See Section 1.05 E & F for details

3.05 SYSTEM TRAINING

A. After the system is substantially complete and operational, provide on-site training of facility security, security supervisory, and maintenance personnel.
   1. Provide a minimum of 1 week notice to the Director's Representative, so that a training schedule can be set up with facility personnel and arrangements can be made for a location to hold the training.
   2. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).

B. System Operation Training: Training shall be set-up so that at the end of training, facility (security, security supervisory, and maintenance) personnel shall have a complete understanding of:
   1. How the system operates.
      a. Training should include precautionary concerns that personnel should be aware of that could affect proper operation of the system.
      b. Training should include how the system responds to alarm location at the system coverage boundaries and adjacent alarm zones.
   2. Knowledge of all components in the system and their function.
   3. Testing procedures for the system required to be performed by the facility

C. System Maintenance Training: Training shall be set-up so that at the end of training, facility personnel shall have a complete understanding of:
   1. Routine (monthly quarterly, or annual) maintenance required to the system and how to perform that maintenance.
      a. Training should include precautionary concerns that personnel shou,ld be aware of that could affect proper operation of the system.
   2. Knowledge of all components in the system and adjustments to the components that they would be required to perform to maintain operation of the system.
   3. Programming of the system.
      a. Training should include, but is not limited to, the following:
         1) How to add subscribers (individuals) to the Subscriber database including images.
         2) How to setup Alarm Areas (Zones).
         3) How to transition from the master Computer to the Slave.
         4) How to configure the Escort Software.
         5) How to program additional receivers, transponders, and points into the system's programming.
         6) How to remove receivers, transponders, and points from the system's programming.
         7) How to store and restore system programming to disk, via the master computer.
         8) Training should include instruction in all programming required by the system necessary for the system to operate as outlined n the SYSTEM DESCRIPTION.

9) Training should include precautionary concerns that personnel should be aware of that could affect proper operation of the system.

4. Annual testing procedures for the system required to be performed by the facility.

END OF SECTION

SECTION 283100

FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 COMPLIANCE

A. Compliance with the provisions of this Standard Specification is required; no substitutions or changes shall be made without prior written approval.

1.02 PROJECT SCOPE

A. Provide all materials and labor for the installation of new fire alarm systems to monitor and control new and existing initiating devices, notification appliances, and output control devices as permitted by NFPA 72.
   1. The new fire systems shall utilize a main control panel in each building connected via existing fiber optic cable to the Proprietary System Monitoring equipment located in the Building 16 Safety Office.
   2. Each building shall be provided with a main control panel, located on shown on the drawings, to communicate to the initiating devices, output devices and notification appliances.
   3. Buildings 6, 10, 11, 12, 14, 15, and 17.
      a. Provided and install a new main control panel and a one-for-one replacement of existing alarm initiating devices, notification appliances, control and remote annunciation equipment as shown on the Drawings.
      b. Provide and install an occupant notification signaling system including audible/visual notification appliances.
      c. Except where shown on the Drawings, reuse existing wiring.
      d. Remove all existing devices, appliances and control equipment.
   4. Buildings 2, 4, and 5.
      a. Provide and install a new main control panel to communicate to new initiating devices, notification appliances, control and remote annunciation equipment as shown on the Drawings.
      b. Provide and install a one-way voice communications/evacuation signaling system including audible/visual notification appliances.
      c. Remove all existing devices, appliances and control equipment.
   5. Building 16.
      a. Provide and install the 410U equipment necessary to connect to the Proprietary Supervising Station via fiber optic cable.
      b. Provide and install fiber optic cable as shown on the Drawings.

B. In Building 15, provide and install smoke detectors, heat detectors, control relays, and monitor devices necessary to initiate primary and alternate floor elevator recall, elevator power shunt trip, shunt trip power supervision and firefighters emergency warning light in accordance with NFPA 72.

C. In Buildings 2, 4, 5, 6, 11, 12, 14, and 17, provide and install smoke detectors, control relays, and monitor devices necessary to initiate primary and alternate floor elevator recall, and firefighters emergency warning light in accordance with NFPA 72.

D. Provide and install devices, equipment and wiring as necessary to monitor the following via the new fire alarm system:
   1. Existing and new fire sprinkler systems per NFPA 13 or 13R.
      a. Existing waterflow and tamper switches to be reused shall be tested to ensure proper operation prior to connecting to the new fire alarm system. Any devices that are inoperable are to be replaced.
   2. New and existing kitchen range hood and duct system and other special fire suppression systems per the appropriate NFPA standard.
   3. Existing Stairtower smoke vents where shown on the Drawings.

E. Provide and install automatic initiating devices.
   1. Provide and install alarm initiating devices as shown on the drawings.
      a. Smoke detectors
      b. Fire detectors
      c. Heat detectors
   2. Provide and install supervisory initiating devices as shown on the drawings.
      a. Duct smoke detectors

F. Provide and install manual fire alarm stations as shown on the drawings.

G. Install key locked manual fire alarm stations in Buildings 2, 4, and 5 as shown on the Drawings.

H. Provide and install devices, equipment and wiring necessary to transmit all fire alarm, supervisory and trouble signals to the Campus Security Office

I. Provide and install magnetic door hold-open devices for doors as shown on the drawings.
   1. The control for door closure shall be zoned by floor, i.e. operation of an initiating device will cause only the doors located in the affected floor to close.

J. Provide and install the connections to the HVAC units for HVAC shutdown as shown on the drawings.

K. Provide and install the connections to any additional project specific fire safety control functions, as shown on the drawings.

L. The fire alarm system shall be totally separate from all other systems, and shall not share raceways with any other systems. The fire alarm system is allowed to be integrated with a compatible building management system as permitted by NFPA 72.

M. The fire alarm control panels shall be powered from a 120 VAC commercial power source and shall include standby power from batteries and/or an emergency generator. The standby batteries shall be of sufficient capacity to maintain the system in a non-alarm condition for 24 hours, followed by 5 minutes in full load alarm condition in Buildings 6, 10, 11, 12, 14, 15, and 17 and 15 minutes in full load alarm condition in Buildings 2, 4, and 5, on battery power only. Full load alarm condition shall be interpreted to mean alarm annunciation throughout the building, simultaneously

N. The 120VAC power source shall be properly identified and labeled.

O. All AC power supply conductors, remote signaling conductors, and communication (data) conductors shall be protected from lightning strikes and power surges in accordance with the applicable sections of the National Electrical Code (NEC), ANSI C-62.1 and UL 1449.

P. Prepare and submit shop drawings, and other submittals required by Section 014000.

Q. Obtain and secure all permits, plan check approvals, and inspections. Contractor shall be responsible for obtaining complete final system acceptance and approvals by the Director's Representative.

R. Provide a minimum of eight (8) hours of training per building, for staff and personnel, in the operation and use of the system. The training shall be divided into two (2) four hour classes and shall be conducted on the various work shifts, as required by the Director's Representative.

S. Upon completion, the contractor shall provide Director's Representative and the Facility with the documentation required by Section 014000.

1.03 SEQUENCE OF OPERATION

A. SYSTEM ALARM OPERATION

1. Activation of any manual station, / area smoke detector, heat detector, elevator lobby smoke detector, elevator machine room smoke detector, elevator shaft smoke detector, elevator machine room heat detector, elevator shaft heat detector / or alarm-initiating addressable input module shall result in, as a minimum, the following functions and indications:
    a. Transmit an alarm signal to the FACP indicating device address, device type, device location, time and date.
    b. Transmit an alarm signal to the appropriate receiving agency and/or on-site location.
    c. Activate emergency evacuation audible and visual notification appliances as indicated in the Input/Output matrix on the drawings.
    d. Annunciate the alarm signal on system remote alphanumeric annunciator(s).
    e. Record all events at the Proprietary Station alarm printer.
    f. Close magnetically held fire doors as indicated in the Input/Output matrix on the drawings.
    g. Record event in the non-volatile system historical log.
2. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors shall initiate an alarm condition on the building fire alarm system and shall visibly indicate, at the control unit and required remote annunciators, the alarm initiation circuit or zone from which the alarm originated. Actuation from elevator hoistway and elevator machine room smoke detectors shall cause separate and distinct visible annunciation at the control unit and within the elevators themselves to alert fire fighters and other emergency personnel that the elevators are no longer safe to use. The following shall also apply:
    a. Elevator lobby, hoistway, and machine room smoke detectors shall provide those automatic alarm functions as described in A.1.
    b. Alarm activation of the primary floor elevator lobby smoke detector shall automatically initiate recall of the associated elevator(s) to the alternate floor, illuminate the fireman's cap in the elevator cab continuously, and all required hoistway vents to open and mechanical ventilation fans to operate in fire emergency smoke evacuation mode.

c. Alarm activation of any other elevator lobby smoke detector shall automatically initiate recall of the associated elevator(s) to the primary floor, illuminate the fireman's cap in the elevator cab continuously, and all required hoistway vents to open and mechanical ventilation fans to operate in fire emergency smoke evacuation mode.

d. Alarm activation of the elevator machine room smoke detector(s) shall automatically initiate recall of the associated elevator(s) to the primary/alternate floor and illuminate the fireman's cap in the elevator cab intermittently.

e. Alarm activation of any single elevator shaft smoke detector shall automatically initiate recall of the associated elevator to the primary floor and illuminate the fireman's cap in the elevator cab intermittently.

3. Elevator hoistway, and elevator machine room heat detectors (if sprinklered) shall initiate an alarm condition on the building fire alarm system and shall visibly indicate, at the control unit and required remote annunciators, the alarm initiation circuit or zone from which the alarm originated. Activation of any single elevator hoistway or machine room heat detector shall automatically activate the elevator power shunt relay, causing immediate disconnect of the main line power supply to the affected elevator. The power for the shunt trip shall be supervised.

4. Alarm activation of a stairwell smoke detector shall automatically:
   a. Provide those automatic alarm functions as described in A.1.
   b. Shall cause the activation to release/open the hatch/vent in the affected stairwell.

B. SYSTEM SUPERVISORY FUNCTIONS

1. Activation of any supervisory circuit, (i.e.; activation of duct smoke detector, supervised fire sprinkler valve closure, fire suppression system air pressure abnormal, low temperature, fire pump trouble, emergency fuel tank level alarm, fire sprinkler corrosion monitoring probe, fire sprinkler air vent relief valve, fire sprinkler corrosion chemical delivery system), shall cause the following actions and indications:
   a. Transmit a supervisory signal to the FACP indicating device address, device type, device location, time and date.
   b. Transmit a supervisory signal to the appropriate receiving agency and/or on site location.
   c. Annunciate the supervisory signal on system remote alphanumeric annunciator(s).
   d. Record event in the non-volatile system historical log.
   e. Record all events at the system alarm printer.

C. SYSTEM TROUBLE FUNCTIONS

1. Receipt of a system trouble alarm (i.e.; loss of primary and battery power, loss of communication to a device, system ground fault), shall cause the following actions and indications:
   a. Transmit a trouble signal to the FACP indicating device address, device type, device location, time and date.
   b. Transmit a trouble signal to the appropriate receiving agency and/or on site location.
   c. Record event in the non-volatile system historical log.
   d. Record all events at the system alarm printer.

2. The fire alarm system wiring (except control wiring to fans, dampers, 120V AC door holders, etc.) shall be electrically supervised to automatically detect and report trouble conditions to the FACP.

3. System addressable devices shall be supervised for placement and normal operation. Removal of an addressable device or the failure of its internal electronic circuitry shall initiate a system trouble condition.
4. The FACP, remote transponders, and auxiliary power supplies shall initiate a system trouble condition when any of the following occurs:
    a. Primary power is lost.
    b. Battery is disconnected.
    c. Battery indicates low voltage.
    d. FACP printer power is lost (FACP only).
5. The operation of a monitoring station disconnect switch or any manual control commands that alter the system from its normal programmed configuration shall initiate a trouble condition.
6. Trouble conditions shall automatically activate an audible signal and flash the general system trouble LED indicator at the FACP. Pressing the trouble acknowledge key on the FACP shall silence the audible signal and continuously light the LED indicator, until the trouble condition is repaired. Subsequent trouble conditions shall re-sound the audible signal and again flash the LED. Each trouble condition must be individually acknowledged.

D. SYSTEM BYPASS FUNCTIONS
1. The system shall be configured to provide manual bypass buttons on the FACP to bypass or disable system functions in event of testing or servicing of the fire alarm system. The minimum bypass functions are:
    a. Notification Appliance Circuit Activation
    b. HVAC shutdown
    c. Magnetic door Holder Release
    d. Elevator Recall / Elevator Power Shutdown Functions

1.04 SYSTEM DESCRIPTION

A. The system shall be based on an intelligent system with addressable initiating devices and hardwired notification circuits.

B. All panels and systems shall communicate with the main fire alarm control panel via peer-to-peer network communications. The panels shall be capable of automatic default to stand-alone mode if failure occurs in any processor, internal connection, or module.

C. All fire alarm systems must be installed to meet the operational requirements of NFPA 72 regarding proprietary systems and be listed and utilize devices compatible and intended for such use.

D. System components shall be modular in design to ensure future expansion capability of the systems.

E. The control panels and auxiliary power supplies shall have spare, installed capacity enabling them to support a 20% increase on each SLC and notification appliance circuit. Spare circuit and power capacity shall be evenly distributed throughout the system.

F. The system shall be equipped with standby power supplies capable of supporting all dependant devices and equipment as required by these specifications.

G. All system wiring shall be monitored for integrity in accordance with NFPA 72.

H. All amplifiers and tone generators for one-way voice signaling shall be equipped with at least one redundant backup unit per control panel/transponder configured to automatically switch over upon primary unit failure.

I. All system devices and functions shall be zoned by floor.

J. Initiation Device Circuits (IDC)
   1. Fire alarm and supervisory alarm initiation device circuits shall be a minimum class B as described and required by NFPA 72
   2. Initiating device circuits shall be segregated such that the largest single fault area does not exceed one zone.

K. Signaling Line Circuits (SLC)
   1. Signaling line circuits (SLC) shall be a minimum class B, style 4 as described and required by NFPA 72.
   2. Signaling line circuits serving more than one floor or zone shall be segregated by the floor or zone by addressable loop isolators such that the largest single fault area does not exceed one floor or zone.
   3. The Addressable loop isolators shall be installed adjacent to equipment control panels or terminal cabinets.

L. Data/Network Circuits
   1. All system network wiring (i.e. circuits between addressable control panels) shall be a hybrid class A, style 7 as described and required by NFPA 72, except as defined in item number 2 below.
   2. All class A supply and return wiring for data/network circuits (risers and inter-control unit wiring) and those serving separate (attached or unattached) buildings will be allowed to be run in the same conduit, raceway, chases, / duct banks, or electrical closets.
   3. Circuits connecting remote annunciation devices with the control panel shall be a minimum class B as described and required by NFPA 72.
   4. Circuits between separated buildings and the central supervising station/proprietary system shall conform to NFPA 72 requirements for supervising station fire alarm systems.

M. Notification Appliance Circuits (NAC)
   1. Notification appliance circuits shall be a minimum class B as described and required by NFPA 72.

N. Auxiliary Function Control Circuits
   1. Auxiliary function control circuits shall be a minimum Class B two-wire circuits supervised with end-of-line resistors or be Class B polarity reversing circuits connected to NACs. If relays are controlled by an SLC it shall conform to 1.04.K above.
   2. All auxiliary function control circuits that affect life safety shall be configured and include components to provide "failsafe" operation in the event of power failure or loss of circuit integrity.

O. Power Supplies
   1. Primary power for each building’s main control panel shall be derived from the existing control panel primary power source.

2. All portions of the fire alarm systems, with the exception of magnetic door hold open devices, shall be equipped to be capable of operating on standby (rechargeable) battery power and/or UPS. Door hold open devices shall release in the event of main power loss.
3. Upon failure of AC primary power, the affected portion(s) of the system(s) shall automatically switch over to battery power without disruption of normal system annunciation or operation.

P. HVAC System Interface
1. When there is no building management, the HVAC system shutdown and smoke damper closure functions shall be performed by the fire alarm system.
2. Where interface relays are used to control HVAC equipment, the wiring up to and including relay coils must be supervised by the fire alarm system for integrity. Unsupervised wiring that extends from the relay to the controlled equipment shall be fully protected in rigid, EMT or flexible metal conduit raceways or other suitable enclosures, and shall not exceed 3 feet in total length.
3. All intersystem conductors shall be supervised for integrity.
4. Duct smoke detectors shall be monitored and supervised by the fire alarm system. In addition, duct smoke detectors are allowed to be reported to the building management system.
5. HVAC system shutdown shall be automatically controlled upon activation of a duct smoke detector, an area smoke detector, floor zone waterflow detector or another automatic fire detector monitoring the area served by the associated HVAC system. Signal supervisory devices shall not cause HVAC system shutdown.

Q. Annunciation
1. The fire alarm system shall be provided with a combination of:
   a. System LCD alpha-numeric annunciator.
   b. Remote annunciator.
2. All system devices, zone designations and other alarm, trouble and supervisory conditions shall be clearly and uniformly annunciated on all textual devices, i.e. PC annunciator, printer, LCD displays indicated the device type, zone designation, floor, status and time of condition. When used, only approved abbreviations shall be used, as follows:
   a. Flr — Floor
   b. Rm — Room
   c. Bldg — Building
   d. Smk — Smoke detector
   e. Heat — Heat Detector
   f. Pull — Manual pull station
   g. Tel — Firefighter telephone
   h. Flow — Waterflow Switch
   i. Tmpr — Tamper Switch
   j. Duct — Duct smoke detector
   k. Fire — Fire alarm condition
   l. Trbl — Trouble condition
   m. Supv — Supervisory condition
3. Time shall be displayed in hours, minutes and seconds, a.m. or p.m.
4. All fire alarm system designation locations shall correspond with the facility's operational area designations.

5. The system shall be designed and equipped to receive, monitor and annunciate signals from new and existing fire and supervisory alarm initiating devices and circuits installed throughout the building.
6. The system shall provide a continuous permanent record as well as a 300 event alarm and a 300 event supervisory historical log on command of all monitor point changes-in-state, trouble signals, operator commands and system initiated control functions via the system printer.
7. The system shall continuously annunciate the current status of the entire system, including all monitor point changes-in-state, trouble signals, operator commands and system initiated control functions, on the LCD and existing Proprietary Station PC annunciator display, where provided.
8. The existing Proprietary Station PC annunciator and printer is located at the Building 16 safety office.
9. The system shall continuously annunciate the current alarm and trouble status of the system.
10. Receipt of fire alarm, supervisory alarm or trouble signals shall activate integral audible devices at the system control panel and at each remote annunciation device:
    a. The integral audible device shall produce a sound output upon activation of not less than 80 dBA at ten feet.
    b. Fire/supervisory alarm and trouble signals shall initiate recognizably different audible outputs.
    c. Integral audible devices shall continue to sound at each annunciator device location until silenced by a system operator.
    d. Receipt of subsequent fire alarm, supervisory alarm or trouble signals shall cause the integral audible devices to resound.
11. All annunciation equipment shall be powered from the system CPU power supply via supervised circuits or shall be equipped with integral power supplies or standby power supplies, meeting the requirements of this specification.
12. All circuits between the CPU and the specified annunciation devices shall be supervised.
13. All annunciator devices shall be supervised by the system for loss of both power and signal (data).

R. Remote Annunciator(s)
1. Remote annunciators shall be located as shown on the drawings.

S. Transmission of Fire Alarms to the Proprietary Station.
1. Upon any fire alarm signal, a signal shall be automatically transmitted to the proprietary station, network/data communications.
2. All wiring and terminations between the fire alarm system and any on-site equipment necessary for performing this function shall be electrically supervised by the fire alarm system. Faults in monitored circuits that prevent transmission of fire alarm signals to the proprietary station shall cause a trouble signal at the main control panel.
3. Remote system monitoring means and arrangement are subject to the approval of the Director's Representative.
4. Update existing systems and LCD displays to annunciate the newly added system and associated addressable points.
5. As a minimum,
    a. The system shall transmit alarm trouble and supervisory conditions on a point-by-point basis to a 24-hour attended location in accordance with NFPA 72 requirements for proprietary monitoring systems.

T. Occupant Notification System – Buildings 6, 10, 11, 12 ,14 ,15 and 17.

1. Occupant notification system shall be accomplished throughout the building via horns, horn/strobes and strobe notification appliances. The notification signal shall be a synchronized three-pulse temporal pattern American National Standard evacuation signal.
2. The occupant notification system shall be zoned to align with the building sprinkler zones, smoke control zones, and the building evacuation plan.
3. Notification appliances shall consist of fire alarm horns and strobe lights.
4. Audible notification appliances shall be installed and spaced so as to produce a sound output on alarm, which is clearly heard above the average ambient sound level throughout all occupiable areas of the building. In no case shall the audible alarm be less than 15 dB above the average ambient room sound level or less than 5 dB above the maximum sound level having a duration of at least 60 seconds whichever is greater. The minimum sound pressure level for mechanical rooms shall be 90 dB. The sound levels shall be determined using the A-weighted scale (dBA).
5. Audible notification appliances installed in sleeping areas shall be spaced to produce a sound output of at least 15dB above the average ambient sound level or 5dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75dB, whichever is greater, measured at the pillow level in each sleeping room, using the A-weighted scale (dBA).
6. Audible and visual notification appliances shall be synchronized. Provide a synchronized temporal pattern audible tone.. The synchronization modules shall be capable of synchronizing appliances with candela ratings ranging from 15 cd to 177 cd.
7. High output horn notification appliances are allowed to be utilized in areas with a high ambient noise levels.
8. Removal of any occupant notification signaling appliance from its associated notification appliance circuit shall cause a trouble signal at the fire command center identifying the affected circuit.
9. The system shall be electrically supervised against faults in the notification circuits and interface wiring, loss of power, module removal, and power supply failure.
10. System faults shall be annunciated audibly and visually at the fire alarm control panel [and recorded on the system printer].
11. Required power capacity shall be calculated based on the following parameters:
    a. The actual number and power requirement (amperage) of the horns, horn/strobes, and strobes located throughout the associated evacuation signaling zone.
    b. Power supply de-rating factor of 20%.

U. Voice Evacuation Communication/Signaling System – Buildings 2, 4, and 5

1. Provide dual channel one-way emergency communication capability on either an automatic or operator selectable zone-by-zone or "all-call" basis via the fire alarm speakers. Equipment shall be arranged so that speaker zones can be selected individually, in any combination of individual zones or on an "all-call" basis for "public address" paging, digitized voice message, or tone generator signals.
2. Evacuation signaling shall be accomplished throughout the building via one-way synthesized voice message tone speakers with override capability. The one-way voice system microphone shall take precedence over automatic system tones/announcements.
3. The evacuation signaling system shall be zoned by floor.
4. Operating voltage of all fire alarm voice/tone speakers shall be 70.7 VAC.
5. Notification appliances shall consist of fire alarm speakers and strobe lights.
6. Audible notification appliances shall be installed, spaced and tapped so as to produce a sound output on alarm, which is clear and intelligible above the ambient sound level

throughout all occupiable areas of the building. In no case shall the audible alarm be less than 15 dB above the ambient room sound level or less than 5 dB above the maximum sound level having a duration of at least 60 seconds whichever is greater. The minimum sound pressure level for mechanical rooms shall be 90 dB. The sound levels shall be determined using the A-weighted scale (dBA).

7. Audible notification appliances installed in sleeping areas shall be spaced to produce a sound output of at least 15dB above the average ambient sound level or 5dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75dB, whichever is greater, measured at the pillow level in each sleeping room, using the A-weighted scale (dBA).
8. Initially tap all speakers as shown on the drawings. After post installation (before final acceptance testing), re-tap speakers as necessary to meet the requirements of this section.
9. Provide synchronization of all visual appliances. The synchronization modules shall be capable of synchronizing appliances with candela ratings ranging from 15 cd to 177 cd.
10. Removal of any evacuation signaling device from its associated notification appliance circuit shall cause a trouble signal at the fire command center identifying the affected circuit.
11. Upon activation of any alarm device, a pre-alert tone consisting of three slow whoops followed by a synthesized female voice announcement shall sound throughout the building for four cycles. The voice message shall be as follows:

    "Attention: A fire emergency has been reported in the building. Please respond according to the fire and emergency plans. Do not use the elevators."

12. Upon resetting of the alarm, i.e., resolution of the alarm condition, the following announcement, by the same synthesized female voice, shall be sounded throughout the building and sounded 2 cycles.

    "Attention: The fire emergency has been investigated and it is safe to resume normal activities".

13. A backup tone generator shall be provided. At the manufacturer's option, this shall be either an auxiliary circuit board in the master control unit, a second source of auxiliary tone, or other backup means of tone generation as provided by the manufacturer, and be UL listed.
14. One backup amplifier shall be provided for each set of primary amplifiers, and shall be equal to the highest power rated (wattage) primary amplifier provided. The backup amplifier shall automatically transfer in place of the defective amplifier.
15. The evacuation signaling system shall be arranged for automatic operation, with provision for manual operation/override at the fire command center.
16. The system shall be electrically supervised against faults in speaker circuits and interface wiring, loss of power, module removal, and amplifier, tone generator or pre-amp failure.
17. System faults shall be annunciated audibly and visually at the fire alarm control panel, proprietary station / central station / remote station / and recorded on the system printer.
18. Required amplifier capacity shall be calculated based on the following parameters:
    a. The actual number and power requirement (wattage) of speakers located throughout the associated evacuation signaling zone.
    b. An amplifier de-rating factor of 20%.

V. Auxiliary Function Interfaces (Relays)
1. Auxiliary function relays shall be failsafe or otherwise electrically supervised.
2. All auxiliary function relays shall be operated by 24 V DC fire alarm system outputs and shall have contacts rated for the required load.
3. All auxiliary function relays shall be provided in appropriate metal enclosures. Relay enclosures shall be painted fire-engine red and shall be clearly and permanently labeled, identifying the mechanical equipment controlled and the relay function with engraved plastic tags - 1/4" white letters on red background.

W. Elevator Control Interface – Buildings 2, 4, and 5
1. Provide an elevator control interface cabinet with a terminal strip for each elevator controller provided in the immediate vicinity of the associated elevator controller.
2. The terminal strip shall have 3 of pairs of terminals, arranged as inputs to the elevator controller [primary recall, alternate recall, firefighters warning light] as applicable.
3. Provide 3 of auxiliary function relays at each elevator controller interface. The 1st relay shall be arranged to energize when the elevators associated with that controller are to recall to the primary recall floor, the 2nd relay shall be arranged to energize when the associated elevators are to recall to the alternate recall floor. The 3rd relay shall enable illumination of the firefighter's warning light intermittently.
4. Elevator recall function shall be grouped or zoned by elevator bank, one zone (set of control relays,) for each bank of elevators.

X. Elevator Control Interface – Buildings 6, 11, 12, 14, 15, and 17
1. Provide elevator control interface as shown on the drawings.

Y. Additional Functions
1. Additional indications, notifications, enabling functions or control functions shall be as outlined in the Fire Alarm Control-by-Event Matrix on the fire alarm drawings.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. SimplexGrinnell

2.02 GENERAL

A. All devices, systems, equipment, and materials shall be new and listed by Underwriters Laboratories, Incorporated (UL) or approved by FM Global (FM) for their intended use. All equipment shall be installed in accordance with the manufacturer's recommendations, the listing or approval limitations, and NFPA 72. Compatibility listing requirements for interconnected separate voice communications systems, fire alarm systems, and smoke detectors shall be met. The designer shall provide evidence of listings of all proposed equipment and combinations of equipment with his submittal.

2.03 FIRE ALARM NETWORK CONTROL PANELS

A. The fire alarm system operating voltage shall be 24 VDC.

B. The panel(s) shall consist of the following minimum base parts:
1. 4100-9111 Master Controller with Operator Interface

2. 2975-9426 Three-Bay Beige Box with Glass Panel
3. 4100-2301 Expansion Bay(s) (to fill two or three-bay box)
4. 4100-6014 Modular Network Interface - Data (Buildings 6, 10, 11, 12, 14, 15, and 1)
    a. 4100-6057 Fiber Media Module (2ea. ()
5. 4100-6014 Modular Network Interface – Audio & Data (Buildings 2, 4, and 5)
    a. 4100-6074 Multi-Mode Left Port Fiber Modem Assembly
    b. 4100-6075 Multi-Mode Right Port Fiber Modem Assembly

C. Additional amplifiers, power supplies, batteries, switch panels, annunciator panels, blank panels, microphone, firefighter phone, and associated modules and boards shall be provided as determined by additional operational requirements outlined within the contract documents.

D. Devices or controls to reset the system shall be provided. The system shall not be capable of being reset until all alarm conditions have been cleared.

E. The panel shall transmit signals to the annunciators, / printer and PC annunciator / display(s) for annunciation in accordance with specification Section 1.04.T.

F. The panel shall automatically sound an evacuation signal throughout the building.

2.04 REMOTE ANNUNCIATORS

A. Remote annunciator(s) for Buildings 6, 10, 11, 12, 14, 15, and 17 shall be model number 4603-9611 Basic Remote Annunciator with model number 4100-1292 Remote Command Center.

B. Remote annunciators for Buildings 2, 4, and 5 shall be model number 4603-9611 Basic Remote Annunciator with model number 4100-1292 Remote Command Center, model number 4100-1244 Remote Microphone module, model number 4100-1254 2 Channel Operator Interface Module, and model number 4100-1280 LED/Switch Module.

2.05 ALL POWER SUPPLIES

A. Design load connected to any power supply or standby battery shall not exceed 80% of its rated (continuous) capacity. Battery size shall be calculated by determining required amp-hour capacity (load x time) and dividing by 0.80.

B. Standby power (batteries and/or generator) capacity shall be sufficient to maintain the system in a non-alarm condition for 24 hours, followed by / 5 minutes in full alarm load condition in Buildings 6, 10, 11, 12, 14, 15, and 17 and followed by 15 minutes in full load alarm condition in Buildings 2, 4, and 5, on battery power only. Full load alarm condition shall be interpreted to mean alarm annunciation throughout the building, simultaneously.

C. Power supplies shall be capable of recharging their associated batteries, from a fully discharged condition in 48 hours maximum.

2.06 BATTERIES

A. Batteries sets (depending upon individual panel load) shall be comprised of one of the following:
1. 2081-9272, 6.2 AH (two required)
2. 2081-9274, 10 AH (two required)

3. 2081-9288 12.7 AH (two required)
4. 2081-9275, 18 AH (two required)
5. 2081-9287, 25 AH (two required)
6. 2081-9276, 33 AH (two required)
7. 2081-9296, 50 AH (two required), with 4100-6050 battery shelf

2.07 ADDRESSABLE MANUAL FIRE ALARM STATIONS

A. Manual fire alarm stations shall be model number 4099-9001 w/ model number 2099-9828 institutional kit (key-operated type) in Buildings 2, 4, and 5 and shall be model number 4099-9003 dual action type in Buildings 6, 10, 11, 12, 14, 15, and 17.

B. Manual fire alarm stations shall be annunciated by floor of origin.

C. Manual fire alarm stations shall be provided at all nurses' stations in the patient wards, in the corridors near each exit entrance outside of the patient wards, and as otherwise required to meet the maximum 200-ft. travel distance requirements of NFPA 72.

D. The operable part of the manual pull box for all new manual fire alarm station locations shall be located no less than 42 inches above the floor, and no greater than 48 inches above the floor.

2.08 ADDRESSABLE SMOKE DETECTORS

A. Detectors shall consist of the following part numbers:
1. 4098-9714, Photoelectric smoke sensor
2. 4098-9792, Standard base

B. Smoke detectors shall be located and installed in accordance with the manufacturer's recommendations and NFPA 72. Detectors shall not be located within 3 feet of HVAC system outlets. Detectors shall not be located near HVAC inlets or operable windows that can affect their ability to function properly. Detectors shall not be installed until after the construction cleanup of all trades is complete and final.

2.09 ADDRESSABLE DUCT SMOKE DETECTORS

A. Sampling tube type duct smoke detectors shall be provided in conformance with the requirements of NFPA 72, and shall consist of the following part numbers:
1. 4098-9714, Photoelectric smoke sensor
2. 4098-9756, Duct sensor housing w/ supervised relay output

B. Each duct smoke detector shall be provided with a remote manual test station to permit remote detector circuit testing. Provide model number 2098-9806.

C. Shutdown shall be controlled via a separate, remotely-mounted interface relay, i.e., not via smoke detector auxiliary contacts. Controlling device shall either be 4090-9002 IDNet relay or PAM-SD relay controlled and supervised by the 4098-9756 duct sensor housing.

D. Sampling tubes shall be one of the following part numbers:
1. 2098-9796, for ducts up to 12 inches wide
2. 2098-9804, for ducts from 13 to 23 inches wide
3. 2098-9797, for ducts from 23 to 46 inches wide

4. 2098-9798, for ducts from 46 to 71 inches wide
5. 2098-9799, for ducts from 71 to 95 inches wide

E. For ducts larger than the above sizes, spot-type smoke detectors shall be used located within the duct according to NFPA 72 requirements

F. All sampling tube type duct smoke detectors require an access door in the duct to permit inspection of sampling tube.

2.10 ADDRESSABLE HEAT DETECTORS

A. Detectors shall consist of the following part numbers:
1. 4098-9733, Heat sensor
2. 4098-9792, Standard base

B. Heat detectors shall be located as required by ANSI A17.1 for elevator shunt trip operation.

C. Detector actuation temperature shall be coordinated with ambient temperatures. However, it shall have a lower temperature rating and a higher sensitivity (lower Response Time Index) as compared to the surrounding sprinklers.

2.11 ADDRESSABLE INPUT MODULES

A. Addressable input modules shall be model number 4090-9001 or 4090-9051 for high humidity areas.

2.12 ADDRESSABLE CONTROL MODULES

A. Addressable control modules (relay) shall be model number 4090-9002.

2.13 ADDRESSABLE COMBINATION INPUT/CONTROL MODULES

A. Addressable combination input/control module shall be model number 4090-9118.

2.14 COMBINATION AUDIBLE/VISUAL APPLIANCES

A. Audible/visual appliances shall be:
1. 4906-9129, Wall-mounted multi-candela horn/strobe - White.

B. Wire guards, if required, shall be either model number 4905-9961 for wall-mounted appliances or 4905-9927 for ceiling-mounted appliances.

C. Appliances shall be flush mounted in permanent walls or columns, or in ceilings. Surface-mount or semi-flush mount devices in retrofit applications are acceptable with prior approval from the Director's Representative.

D. If wall-mounted appliance is flush mounted in retrofit application, provide or verify the Electrical Contractor is providing industry-standard back box:
1. Arlington model FSR404SRD "old work" back box
2. RACO model 911-3 with model 205RAC "old work" ring
3. Approved equal.

E. If wall-mounted appliance is surface mounted, and industry-standard RACO or equal back box is used, provide 4905-9937 decorative skirt, Red or 4905-9940 decorative skirt, White.

2.15 AUDIBLE APPLIANCES

A. Audible appliances shall be:
   1. 4901-9820, Wall-mounted horn.

B. Wire guards, if required, shall be model number 4905-9961.
Appliances shall be flush mounted in permanent walls or columns, or in ceilings. Surface-mount or semi-flush mount devices in retrofit applications are acceptable with prior approval from the Director's Representative. Modifying the mounting height to improve the audibility is acceptable with prior approval from the Director's Representative; however, the device locations must be installed within the limitations of NFPA 72.

If wall-mounted appliance is flush mounted in retrofit application, provide or verify the Electrical Contractor is providing industry-standard back box:

1. Arlington model FSR404SRD "old work" back box
2. RACO model 911-3 with model 205RAC "old work" ring
3. Approved equal.

C. If wall-mounted appliance is surface mounted, and industry-standard RACO or equal back box is used, provide 4905-9937 decorative skirt, Red.

2.16 COMBINATION SPEAKER/VISUAL APPLIANCES

A. Speaker/visual appliances shall be:
   1. 4906-9153, Wall-mounted multi-candela speaker/strobe - White.

B. Wire guards, if required, shall be model number 4905-9998 for wall-mounted appliances only. Contact SimplexGrinnell should ceiling-mounted wire guards be required.

C. Appliances shall be flush mounted in permanent walls or columns, or in ceilings. Surface-mount or semi-flush mount devices in retrofit applications are acceptable with prior approval from the Director's Representative. Modifying the mounting height to improve the audibility is acceptable with prior approval from the Director's Representative; however, the device locations must be installed within the limitations of NFPA 72.

D. If wall-mounted appliance is flush mounted in a retrofit application, provide or verify the Electrical Contractor is providing industry-standard back box.
   1. Randl Industries model R-55015 "old work" back box with extension ring and Wheelock model SFP semi-flush plate.
   2. RACO 911-2 back box with model 205RAC "old work" ring.
   3. Approved equal.

E. If wall-mounted appliance is surface mounted, and industry-standard RACO or equal back box is used, provide 4905-9947 decorative skirt, White.

2.17 SPEAKER-ONLY APPLIANCES

A. Speaker only appliances shall be:
   1. 4902-9717, Wall-mounted speaker - White.

B. Wire guards, if required, shall be model number 4905-9999 for wall-mounted appliances only.

C. Speakers shall be flush mounted in permanent walls or columns, or in ceilings. Surface-mount or semi-flush mount devices in retrofit applications are acceptable with prior approval from the Director's Representative. Modifying the mounting height to improve the audibility is acceptable with prior approval from the Director's Representative; however, the device locations must be installed within the limitations of NFPA 72.

D. If wall-mounted appliance is flush mounted in new construction application, provide or verify the Electrical Contractor is providing industry-standard back box:
   1. Randl Industries model R-55016 back box with extension ring
   2. RACO model 911-1 back box.
   3. Approved equal

E. If wall-mounted appliance is flush mounted in a retrofit application, provide or verify the Electrical Contractor is providing industry-standard back box.
   1. Randl Industries model R-55015 "old work" back box with extension ring and Wheelock model SFP semi-flush plate.
   2. RACO 911-2 back box with model 205RAC "old work" ring.
   3. Approved equal.

F. If wall-mounted appliance is surface mounted, and industry-standard RACO or equal back box is used, provide 4905-9941 decorative skirt, Red or 4905-9942 decorative skirt, White.

2.18 VISUAL-ONLY APPLIANCES

A. Visual appliances shall be:
   1. 4906-9103, Wall-mounted multi-candela strobe – White.
   2. 4906-9104, Ceiling-mounted multi-candela strobe – White.

B. Wire guards, if required, shall be either model number 4905-9961 for wall-mounted appliances or 4905-9926 for ceiling-mounted appliances.

C. Appliances shall be flush mounted in permanent walls or columns, or in ceilings. Surface-mount or semi-flush mount devices in retrofit applications are acceptable with prior approval from the Director's Representative.

D. If wall-mounted appliance is flush mounted in retrofit application, provide or verify the Electrical Contractor is providing industry-standard back box:
   1. Arlington model FSR404SRD "old work" back box.
   2. RACO model 911-3 back box with model 205RAC "old work" ring

E. If wall-mounted appliance is surface mounted, and industry-standard RACO or equal back box is used, provide 4905-9940 decorative skirt, White.

2.19 REMOTE ALARM INDICATORS

A. Each duct smoke detector, beam smoke detector, and other concealed smoke or heat detector shall be provided with remote alarm LEDs which illuminate when their associated detectors are in alarm.

B. Remote alarm LEDs shall be wall or ceiling mounted in the logical location where they will be readily visible to responding personnel.

C. All remote alarm LEDs shall be clearly and permanently labeled with engraved plastic tags, 1/4 inch white letters on red background indicating the type and location of the associated device.

2.20 SPRINKLER, STANDPIPE AND OTHER SUPPRESSION SYSTEM SUPERVISORY DEVICES

A. The Contractor shall provide and install circuit interfaces for miscellaneous dry contact supervisory devices, such as new or existing sprinkler alarm, supervisory and fixed suppression systems.

B. All circuit interfaces used for supervisory functions shall be mounted within 3 feet of the monitored switch or circuit.

2.21 WATERFLOW SWITCHES

A. All new and existing sprinkler and standpipe system waterflow switches shall be monitored by the fire alarm system.

B. Waterflow switches shall be annunciated individually.

2.22 VALVE SUPERVISORY (TAMPER) SWITCHES

A. All new and existing sprinkler and standpipe system valve supervisory switches shall be monitored by the fire alarm system and cause a supervisory signal as required by NFPA 72 for protected premises systems.

B. Valve supervisory zones, with the exception of devices associated with and in the immediate vicinity of each fire pump shall be arranged to annunciate each valve supervisory switch individually.

2.23 SPECIAL SUPPRESSION SYSTEM MONITORING

A. Provide wiring and equipment as necessary to monitor agent discharge and supervisory conditions from:
   1. Kitchen range hood and duct extinguishing systems.
   2. Other special suppression systems in the building.

B. Remote system monitoring means and arrangement are subject to the approval of the Director's Representative and the Engineer.

2.24 DOOR HOLDERS

A. Where shown on the drawings, door holders are existing and shall be powered from a 24 VDC non-resettable power supply.

B. Where existing door holders are to be replaced the replacement door holders shall be manufactured by Edwards Systems Technology and shall be one of the following models:
   1. 1508-AQN5, Surface/Wall-mounted
   2. 1501-AQN5, Floor-mounted (single door)

C. In any case, the catch and anvil shall both be suicide-resistant insuring that no parts can be removed without the use of special tools.

2.25 SPARE PARTS

A. Provide a quantity equal to 5% / 10% of the number of each type of device installed, but not less than one of each type of initiating Devices.

B. Provide a quantity equal to 5% / 10% of the number of each type (e.g. candela rating) of notification appliance installed, but not less than one of each type.

C. Provide a quantity equal to 2% of the number of each type of detector base installed, but not less than one of each type.

PART 3 - EXECUTION

3.01 DEVICES

A. Mounting
   1. All fire alarm devices shall be rigidly flush or semi-flush mounted, using existing backboxes in Buildings 6, 10, 11, 12, 14, 15, and 17, and the appropriate new backboxes in Buildings 2, 4, and 5 to building structural members, permanent walls, ceilings or fixtures designed or designated by the Director's Representative for the purpose. Surface mounting shall be permitted only for retrofit applications in masonry or similar walls and ceilings. Extension rings, except where used to adapt a box opening, shall be prohibited in new work.
   2. All fire alarm devices shall be supported independently of their installation conductors.
   3. All exposed fasteners in patient accessible areas shall be of a facility approved tamper resistant type.
   4. Exposed backboxes for surface-mounted devices shall not contain electrical knockouts.

B. Wiring Methods
   1. All fire alarm system notification and initiating devices shall be wired to allow supervision of their associated conductors through the device, such that disconnecting any conductor from the device will cause a trouble indication at the fire command center.
   2. Conductors looped around terminals are not acceptable.
   3. Wire nuts are not acceptable.
   4. Where existing circuits contain wire nut splices, solder existing connections, crimp in metal sleeve and encapsulate with epoxy resin.

5. All new device backboxes, pull boxes and terminal cabinets shall be sized to accommodate the number of conductors contained therein. Extension rings or extension boxes are not acceptable in new installations.

C. Locations
   1. All fire alarm initiating device and evacuation signaling device locations shall be shown on the drawings.
   2. All new device locations are subject to the approval of the Director's Representative.

D. Labeling
   1. System Devices
      a. All fire alarm system devices shall be permanently labeled with the address cross-referenced to an overall device listing indicating type of device and exact location to be used for inspection, maintenance and service logging.
      b. Labels shall be self-adhesive for permanent mounting and be mounted so as to be readily visible. Devices such as removable smoke and heat detectors shall also have their mounting bases individually numbered and cross-referenced.
   2. Panel Power Disconnect
      a. Permanently identify the location of the means to disconnect the power source to the control panels, transponder panels, sub-panels and remote NAC panels. The location of the power disconnect shall be identified inside each of the panels.

3.02 INSTALLATION

A. Unless otherwise noted in the drawings, replacement fire alarm control panels are to use the same power source as the existing panel. Wiring and associated conduit may also be reused provided the wiring is deemed acceptable by the OMH standard wiring testing procedure. Any new auxiliary power supplies within the same general area as the new FACP may also use the existing power source, and even the same circuit provided the circuit will not be overloaded.

B. System riser(s) shall be installed in metallic conduit (EMT, IMC, or RMC), located to avoid physical harm. Supply (outgoing) and return risers shall be separately routed as shown on the drawings.

C. Existing fire protection systems shall not be taken out of service without prior written approval from the Director's Representative. When systems are taken out of service, the Contractor shall provide alternative protection acceptable to the Director's Representative until those systems are replaced or restored to service. The contractor shall assure that the system is operational at the end of each work day or shall continue to provide alternative protection until the system can be placed into service.

D. When fire detection and alarm system devices are out of service, they shall be clearly tagged "out of service."

E. Locations of all equipment, controls and system components are subject to the approval of the Director's Representative.

F. Contractor is responsible for protecting both new and existing smoke detectors during construction. These detectors shall be covered during construction. All such covers shall be removed upon completion of work. Covers on working detectors shall be removed at the end of each work day.

G. Existing smoke, heat, and duct detectors which are to remain in place during a repair or renovation shall be protected from dust until after the construction clean-up of all trades is complete and final. Detectors that remain in place during the repair or renovation shall be cleaned or replaced in accordance with NFPA 72.

H. New fire alarm systems and devices shall be put into service on a zone-by-zone basis as soon as they are functional and tested. Once the new fire alarm equipment has been put into service, they shall not be removed from service without written authorization from the Director's Representative.

I. Existing systems being replaced in Buildings 2, 4, and 5 shall be removed immediately after the new fire alarm system is accepted by the Director's Representative. The existing systems being removed shall include the fire alarm equipment, equipment backboxes, fire alarm cabling, and all accessible fire alarm conduit.

J. Existing system devices and equipment being replaced on a one-for-one basis shall be removed as installation of new devices and equipment progresses.

K. All fire alarm equipment (not to include backboxes, conduit, scrap wire, and other equipment not strictly related to the demolished fire alarm system) shall be turned over to the Director's Representative.

END OF SECTION